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ABSTRACT

In one of his latest works, Piaget (1980) describes the course of development as alternating between periods of relative equilibrium, in which thinking is deductive and discursive, and periods of equilibration, in which thinking is dialectical and constructive. Progressive change depends on these dialectical periods, during which the construction of negations and the awareness of contradiction become vital for development. It is contended that this dialectic is formed in social intercourse. This inner dialogue is an internalization of what was originally an external dialogue, started in infancy and early childhood, between children and their caretakers and peers. Where dialectic demands have not been part of childhood and adolescence, the adult student will have to be confronted systematically with contradictions, in the higher education setting, if formal operations are to be elicited. Formal thinking and a manageable appetite for discrepancy can be elicited through the structuring of classroom activities, specifically through classroom exercises in which each student can find his or her own optimal mismatch. The problem presented by the selection, adaptation, and invention of exercises includes making tasks complex enough in form, so that solution would require formal operations, yet circumscribed enough in content, so that their informational aspect could be either assumed or imparted without overtaxing the memory. (YLB)

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TO THINK WELL, BE AWARE AND NOT BEWARE OF CONTRADICTIONS

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TO THINK WELL, BE AWARE AND NOT BEWARE OF CONTRADICTIONS

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We would like to start by sharing with you the assumptions on which our work is based. The three participants in this symposium are basically constructivists, and within constructivism our assumptions are basically Piagetian. Piaget has postulated a force that he calls equilibration as the basic self-regulatory mechanism of change. If transactions between an individual and his environment produce feedback which is discrepant with previous knowledge, then inner tension may result, and inner structures may have to be reorganized, so that equilibrium can be restored or increased. That is, equilibration is used by Piaget as a general model for the causal explanation of how individuals move towards higher levels of construction and how scientists move from one theory to the next (Vuyk, 1981).

Equilibration, especially as expanded in 1975 and 1980, is one of Piaget's more controversial models. But both its proponents and its opponents agree that the notion of negation plays a central role in the equilibration process, and it is on this role that the following discussion will focus. (We are assuming knowledge of such concepts as assimilation, accommodation, tranformation and reversibility.)

Since equilibration implies a balance and a balance involves at least two things, what is being balanced in this model? Piaget (1975) mentions a number of binary contrasts from which different theorists can take their pick: assimilation and accommodation; different subsystems within the mind; the parts of a system and that system as a whole; differentiation and integration; and, through it all, affirmations and negations. By affirmation Piaget means that subjects focus their attention on the existing properties of objects. For instance, a child can learn that object X is a ball, with a shape we call round; and that object Y is a book, with a shape we call square. But the notion of non-square in relation to a ball has to be constructed, because it is based on factors that are not present--it is based on the coordination of mental actions rather than on the actions themselves. And it is the ability to construct such negations that allows for the reversibility of mental actions and permits the attainment of logical thinking.

The motivational power of equilibration is activated by the sense of perturbation that results when a person is in a state of tension and disiquilibrium. Perturbations can be and often are ignored. But during early and middle childhood, at least, they are likely to keep reoccurring until re-equilibration is attained at a higher level; and in order to attain this higher level, the child must be able to compensate between affirmations and negations.

In the young child the unavoidable contradictions of daily life are of themselves sufficient to lead to the construction of negations and to an actual appetite for what Kuhn (1972) has labeled the optimal mismatch. (One of the

first perceived contradictions is that the same action does not always lead to the same result, including actions interiorized as assertions and judgements. If so the reverse action, which would formally cancel the first, does not always have that cancelling power. The child may then believe that i p implies q, then q implies p. For instance, if all men are mortal, then all mortal are men.)

However, once concrete operations are attained, it is quite possible to take care of the immediate practicalities of daily life without facing further contradictions, and then the contradictions themselves have to be constructed in response to patterns perceived in the course of daily life, that is, in response to second order relations (relationships between events) rather than in response to each isolated event in itself.

In one of his latest works, Piaget (1980) describes the course of development as alternating between periods of relative equilibrium, in which thinking is deductive and discursive, and periods of equilibration, in which thinking thinking is dialectical and constructive. If so, it is on these dialectical periods that progressive change depends, and it is during these periods that the construction of negations and the awareness of contradiction becomes vital for development.

It is our contention that it is in social intercourse that this dialectic Piaget talks about is formed. We agree with Vygotsky (1935), Bakhtin (Volosinov, 1927) and Kaye (1982) that this inner dialogue is an internalization of what was originally an external dialogue, started in infancy and early childhood, between children and their caretakers and peers. If the dialectic habit has not been established by home and/or school through systematically reoccurring dialogue prior to adolescence, then the youngster may reach adulthood without fully attaining formal operations. Therefore, where dialectic demands have not been part and parcel of childhood and adolescence, the adult student will have to be systematically confronted with contradictions, in the higher education setting, if formal operations are to be elicited.

This presentation will focus on the eliciting of formal thinking, and on systematic attempts to produce a manageable appetite for discrepancy through the structuring of classroom activities, specifically through classroom exercises in which each student can find his or her own optimal mismatch. Kirley will focus mostly on the socialization aspects of this dialogue, and on the possible existence of a scale of complexity in its acquisition. Beal will focus on listening and verbalization skills, as means of increasing the efficacy of both inner and social dialogue.

Since the purpose of these exercises was to encourage formal thinking, a list of representative (but not exhaustive) formal characteristics was assembled. Formal thinking involves thinking in terms of possibilities rather than actualities, and in terms of necessary reasons rather than actual ones. It involves the isolation of variables, and their appropriate exclusion and inclusion. The problem presented by the selection, adaptation and invention of exercises was twofold: all tasks had to be complex enough in form, so that their solution would require formal operations, once the perturbation became clear at the concrete operations level; at the same time they had to be circumscribed enough in content, so that their informational aspect could be

either assumed or imparted without overtaxing the memory.

A third and equally crucial problem was that exciting interface where emotions and cognition meet. Formal thinking, as Lunzer (1981) argues, requires a high tolerance for lack of closure. It requires a temporary suspension of certainties during which old ways are held in abeyance while new ways are considered. This is easier said than done. We know from a wealth of testimony--from artists, writers and philosophers--as well as from our own introspections, that when we cannot organize the world around us we experience unease, we suffer, we may panic. Consequently, if this temporary suspension of certainties is prolonged beyond a couple of seconds, pressure builds up to reach out for any sort of organization, whether stable or illusory. Giving in to this pressure means staying with or regressing to structures which are inadequate for a good enough symbolic processing of our world. This problem can be especially poignant in the case of students who have a low tolerance for ambiguity and a past of frequent academic failures. In these cases it is especially important to carefully structure the optimal mismatch involved, as well as the consequences of success or continued lack lack of closure. This can be facilitated by not equating any one specific result with either success or with praise and grades. The inability to attain closure can itself be hailed as a necessary step to success, as indeed it is, and students can be rewarded (with attention, encouragement, questions, answers), whatever degree of resolution or delay of resolution is attained. At times, if the curriculum is flexible, this can be built into the curriculum itself; at times, if the curricular demands are non-negotiable, it is better to keep optimal mismatch exercises separate from the curricular demands and the general evaluation system of the course being taught.

We would like to end this part of our presentation by sharing with you one of the exercises invented for one of our classes, a syllogistic exercise which emphasizes isolation and exclusion of variables, and which is somewhat more complex that it seems. If you will, let us follow the process used in the classroom by trying it out individually and in small groups. We would then like to show you a video tape made at Chicago State University, in which small groups of students tackle the same task. (For exercise, see Appendix 1)

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Appendix 1

Exercise 1, Spock and Kirk

Directions: You are being given three premises (term and concept explained if needed) which you are to use to evaluate six hypotheses. These premises are what the logicians call the universe of discourse. That means that this is the truth, the whole truth and nothing but the truth. It is especially the whole truth, and if a piece of information is not here YOU DO NOT KNOW IT. For the purposes of this exercise this is all you know.

Next to each hypothesis put one of the following: T (true), if on the basis of the premises you think you have enough information to evaluate it and it is true; F (false), if on the basis of the premises you think you have enough information to evaluate it and it is false; NEE (not enough evidence), if you think that on the basis of the premises there is not enough information to evaluate it.

Premises:

All men are mortal.

Kirk is a man.

Spock is not a man.

Hypotheses:

1. Kirk is mortal.
2. Spock is mortal.
3. Kirk is not mortal.
4. Spock is not mortal.
5. Both Kirk and Spock are mortal.
6. Both Kirk and Spock are not mortal.